



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,033	03/25/2004	Takatomo Sasaki	10873.1440US01	5813

53148 7590 01/05/2007
HAMRE, SCHUMANN, MUELLER & LARSON P.C.
P.O. BOX 2902-0902
MINNEAPOLIS, MN 55402

EXAMINER

RAO, G NAGESH

ART UNIT	PAPER NUMBER
----------	--------------

1722

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/809,033	SASAKI ET AL.	
	Examiner	Art Unit	
	G. Nagesh Rao	1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3-16, 18-21, 23-25, 27-46, 53 and 55-58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-16, 18-21, 23-25, 27-46, 53, 55-58 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

1) A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/22/06 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2) Claims 1, 3-6, 11, 15, 18, 33-46, 53, and 55 are rejected under 35 U.S.C. 102(b) as being anticipated by Japanese Pub. No. 2000-233993 (previously made of record in the I.D.S. filed 04 August 2004; hereinafter “JP ‘993”). Note the English Abstracts and computer translation of JP ‘993 made of record with this Office Action.

JP '993 discloses a method for manufacturing a semiconductor crystal, specifically a GaN single crystal on a substrate such as quartz glass (Abstract and translation ¶ 19). Alternatively, JP '993 notes that the crystal can be grown on seed crystal nucleus (translation ¶ 24). JP '993 discloses that, using the method, crystal growth of 1500 $\mu\text{m}/\text{h}$ can be obtained (translation ¶ noting 3 mm was grown in 2 hours).

The method includes the step of growing the crystal by crystallizing an aeriform substance comprising a hydride of a Group III nitride of the formula GaN_xH_y (see Abstract). JP '993 notes that the hydride can be obtained from a Ga metal source material (translation ¶ 21). The source material in the process is sublimated by heating at 950 to 1150°C (translation ¶ 19).

JP '993 further discloses the process to include the use of ammonia (NH_3) in the growing atmosphere (Abstract).

3) Claims 56-58 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka et al. (U.S. Pat. No. 6,001,748).

Tanaka discloses a process for preparing a single crystal of nitride. The process includes heating a nitride powder source material to cause the material to evaporate into an aeriform substance (cl. 7, ll. 43-55). Tanaka notes that the

heating can be done in the presence of hydrogen (see cl. 8, ll. 56-61). The aeriform substance is then grown into a single Group III nitride crystal (see for example, cl. 9, ll. 22-33).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in Graham v. John Deere Co., 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the

subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3) Claims 7-10, 12-14, 16, 19-21 and 23-25, 27-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '993 in view of Hunter (U.S. Pat. No. 6,296,956; previously of record).

JP '993 discloses a method for forming a semiconductor crystal as described above. JP '993 does not note the use of a carrier gas to aid in supplying the aeriform substance to the crystal generation region. JP '993 also does not disclose the inclusion of impurities into the system so that the impurities are introduced in the grown crystal.

Hunter discloses a method for the production of bulk single crystals. In the process, Hunter notes that a carrier gas such as N₂ or argon can be injected into the source material section of the process, thereby providing additional flow of

aeriform vapor (cl. 3, ll. 1-5 and cl. 9, ll. 9-15). Hunter further discloses that impurities may be included in the gases so as to have the impurities included in the resulting crystal (cl. 12, ll. 1-15).

It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have modified the process disclosed by JP '993 as such to additionally supplied a carrier gas to the aeriform substance because this would provide additional flow of aeriform vapor to the crystal growth region as suggested by Hunter. Note, as a result of this configuration of the process, the single crystal would be grown in an atmosphere of a mixed gas containing N_2 (from the carrier gas) and NH_3 which is injected in the growth region in process of JP '993 (see for example, translation ¶ 5).

It also would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have modified the method of JP '993 as such to have further introduced impurities into the gases used in the method because this would have allowed for the impurities included in the resulting crystal as suggested by Hunter.

With respect to claim 24, as noted above JP '993 discloses a process wherein the source material is sublimated. Hunter demonstrates, however, that in the single crystal growth methods, the decomposition and evaporation of the source material

is a viable alternative process for generation of the material.vapor (see for example, cl. 2. ll. 64-67). Therefore, it would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to have modified the process disclosed and suggested by JP '993 as such to have decomposed to liquid and evaporated the source material because this is known in the art as an equivalent process as suggested by Hunter.

Response to Arguments

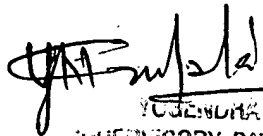
4) Applicant's arguments filed 11/22/06 have been fully considered but they are not persuasive. Examiner has noted the previous examiner's office action and prior art search. Upon review of the case at hand examiner understands from applicant's position that the prior art does not teach the " GaH_x " aeriform substance when in use with the method of manufacturing a Group III nitride single crystal. However examiner upon review of the current amended set of claims, noted applicant's use of the term "comprising" and furthermore in dependent claims the interactive use of Nitrogen sources which would be obviously intermixed with the GaH_x substance to react and create the GaN crystals as well the bi-products resulting from said interaction. The open ended language use of "comprising" and the aeriform substance at hand " GaH_x " still keeps it open option for the inventive

scope to not just be limited to that substance but derivatives of the like such as GaNH and the many others claimed before being canceled by applicant. It is the examiner's position that in order to ensure that the scope is limited to just the use of GaH_x for the method of manufacturing this single crystal that applicant delete the word "comprising" and replace with "consisting". Or provide a CFR 131 or 132 affidavit suggesting why GaH_x would not be conceivably used in the production of the Group III nitride single crystals.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to G. Nagesh Rao whose telephone number is (571) 272-2946. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on (571)272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


YOGENDRA K. GUPTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1760

GNR